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IS 5924 (1988): Clock Mechanisms and Drums for Meteorological Instruments [PGD 21: Meteorological Instruments]



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Indian Standard
SPECIFICATION FOR
CLOCK MECHANISMS AND DRUMS FOR
METEOROLOGICAL INSTRUMENTS
(*First Revision*)

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**AMENDMENT NO. 1 OCTOBER 1993
TO
IS 5924 : 1988 SPECIFICATION FOR CLOCK
MECHANISMS AND DRUMS FOR
METEOROLOGICAL INSTRUMENTS**

(First Revision)

(Page 2, clause 2.5, line 3) — Substitute '1.647 mm/h' for '1.64 mm/h'.

(Page 5, clause 7.3, line 6) — Substitute ' 1.647 mm/h' for '1.64 mm per hour'.

(LMD 21)

Reprography Unit, BIS, New Delhi, India

Indian Standard

SPECIFICATION FOR CLOCK MECHANISMS AND DRUMS FOR METEOROLOGICAL INSTRUMENTS

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards on 3 November 1988, after the draft finalized by the Meteorological Sectional Committee had been approved by the Mechanical Engineering Division Council.

0.2 This standard was originally published in 1970. In this revision, the requirements of drum shells moulded from good quality weather resistant plastics reinforced with metallic inserts and quartz clock movement operating on single dry cell have been incorporated.

0.3 In recording meteorological instruments, the rotating drums on which the charts are fitted are driven by clock mechanisms. In the interest of standardization, clock mechanisms and drums have been designed to be completely interchangeable, that is, any clock mechanism may be used with any drum. Identical clock mechanisms, either 'daily' or 'weekly', are used in all the common recording instruments like barographs, thermographs, hygrographs and recording raingauges. All clock drums have the same diameter but are of three different heights, short, medium and long, to suit different charts.

0.4 Specifications for the clock mechanisms and drums used in meteorological instruments have

been prepared by the Indian Meteorological Department but no Indian Standard Specifications for these exist. With the increasing manufacture of meteorological instruments in the country, the formulation of an Indian Standard for clock mechanisms and drums to be fitted in recording meteorological instruments has become necessary.

0.5 This standard has been prepared in the interest of standardization of clock mechanisms and drums of meteorological recording instruments in use in the country and that of the accuracy in recording of time in meteorological instruments.

0.6 In the formulation of this standard, due consideration has been given to the requirements laid down by the World Meteorological Organization, Geneva in addition to the special circumstances in the country.

0.7 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Rules for rounding off numerical values (revised).

1. SCOPE

1.1 This standard specifies the requirements for the 'daily' and 'weekly' clock mechanisms and drums used with common recording meteorological instruments.

2. DESCRIPTION

2.1 The clock mechanism with drum is of the 'fixed clock' type in which the clock mechanism is fixed to the base of the instrument and the drum is directly attached to and rotates with the main spindle of the clock. The clock itself is stationary and the spindle on which the drum is mounted, is in the main train of gears so that there is no backlash.

2.2 The entire clock mechanism including the main spring is housed in a dust-proof case. An opening with a dust cover enables adjustments of the regulation to be made when necessary.

2.3 The clock is wound by turning the winding key and run for 8 days for one winding in case of both 'daily' and 'weekly' mechanisms. The 'daily' or 'weekly' clock mechanism rotates the drum once about 25½ hours or 7 days and 10 hours, respectively. The overlap allows some margin for the time required to change charts. The 'daily' clock may be regulated over a range of 30 minutes and the 'weekly' clock over 4 hours in 7 days, providing enough range for the correct adjustment of the clocks.

2.4 The drum is a hollow cylinder provided with a diaphragm and a friction collar. The friction drive helps to set the drum to the right position after it has been fitted on the clock. The drum has a narrow flange at the base and the chart is held in position by a chart clip.

2.5 The drum diameter, 93.3 mm, is such that a time scale of 11.5 mm/h is obtained with a 'daily' clock and 1.64 mm/h with a 'weekly' clock.

2.6 A quartz clock movement can also be used for driving the clock mechanism.

3. TYPES

3.1 Clock Mechanism — The clock mechanism shall be of the following two types:

- a) *Daily* — One complete revolution in 25½ hours, and
- b) *Weekly* — One complete revolution in 7 days and 10 hours.

These clock mechanisms shall be spring driven or employ quartz movement.

3.2 Clock Drum — The drum shall be of the following three types:

- a) Short, 90 mm high;
- b) Medium, 130 mm high; and
- c) Long, 175 mm high.

For the plastic moulded drum shells, the corresponding height shall be 95, 135, and 180 mm, respectively.

3.3 While modifications in the details of the clock mechanism are permissible, the general arrangement shall be as shown in Fig. 1, 2 and 3.

3.4 The exact positioning and dimensions of the train of gears is left to the manufacturer who may alter the system shown to suit his particular design. The final product, however, shall satisfy all the requirements of this specification.

4. MATERIAL

4.1 The gear wheels and the barrel shall be made from hard rolled brass. The drum shall also be made from similar material. Drum shells can also be moulded from good quality weather resistant plastic, such as acrylonitrile butadiene styrene (ABS) reinforced with metallic inserts.

4.2 The pinions of the various wheels, the arbor sleeve and the barrel arbor shall be made from silver steel. The main spring shall be of suitable spring steel.

4.3 The screw used shall be of stainless steel or brass.

4.4 All other components shall be made from brass unless otherwise specified. The material used shall be such that it is capable of being finished to exact dimensions and is not affected by exposure to widely varying climatic conditions particularly at coastal stations.

5. DIMENSIONS

5.1 The main dimensions for clock mechanism both 'daily' and 'weekly' shall be as given in in Fig. 1.

5.2 The main dimensions of drum shell winding key and chart clip shall be as given in Fig. 2, 3, 4 and 5, respectively.

6. GENERAL REQUIREMENTS

6.1 Case

6.1.1 The cover shall fit snugly over the barrel of the case. The barrel with cover shall have the overall dimensions of 74 × 34 mm.

6.1.2 The main spring shall be of spring steel, conforming to IS : 4454 (Part 1)-1981 'Specification for steel wires for cold formed springs: Part 1 Patented and cold drawn steel wires — unalloyed (second revision)'.

6.2 Barrel Arbor with Sleeve

6.2.1 One end of the barrel arbor shall be finished square to take the winding key and the other end attached to the collet and provided with a hook to engage the inner end of the main spring. The barrel arbor shall be perfectly straight.

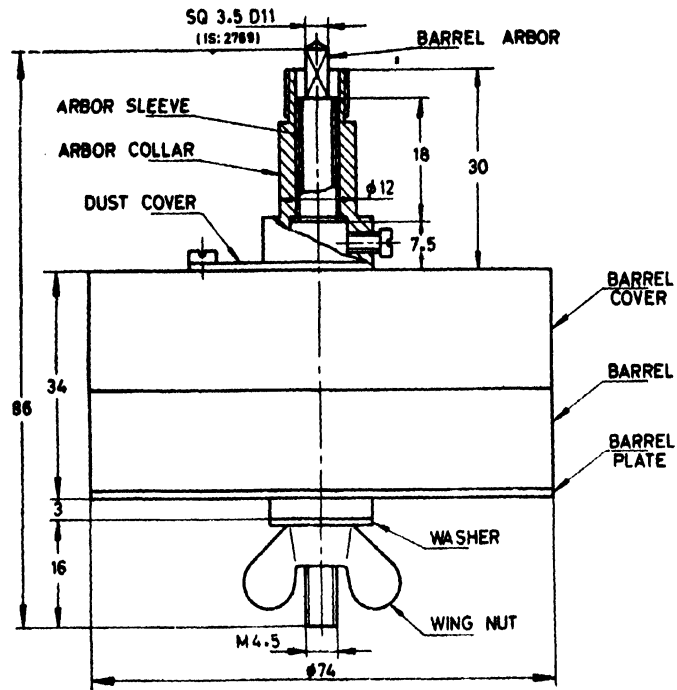
6.2.2 The arbor sleeve fitting over the barrel arbor shall have one end threaded to take the arbor collar and the other end fitted to the main wheel.

6.2.3 An arbor collar shall be screwed over the arbor sleeve and fixed to it by means of two steel screws. The collar shall be capable of being adjusted in height by a distance of approximately 10 mm with respect to the clock-work. The rotation of the arbor sleeve and the arbor collar shall be in a true horizontal plane.

6.3 Drum Shell

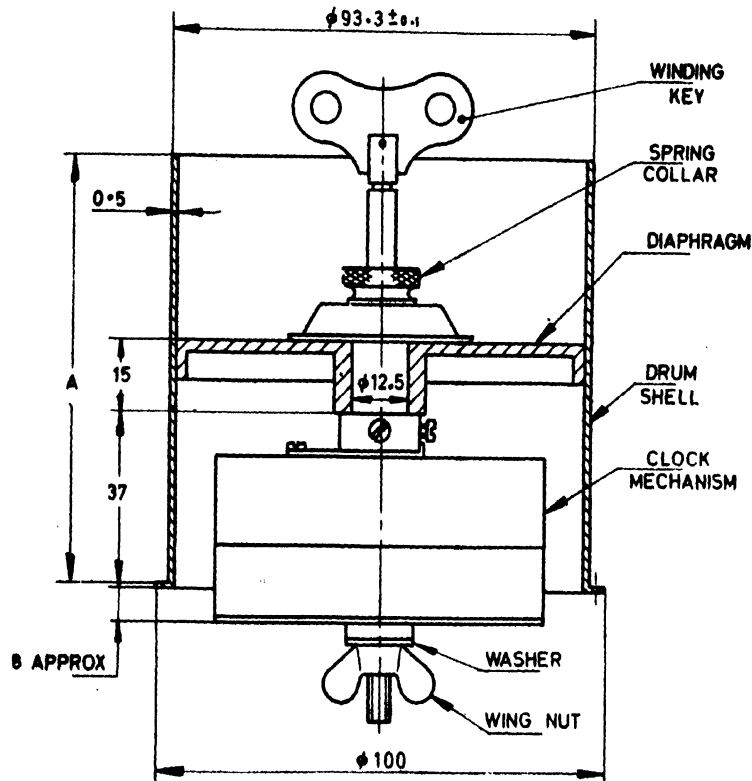
6.3.1 The outside surface of the drum shell shall be finished smooth and shall be truly cylindrical.

6.3.2 A groove at the top edge and a corresponding slot on the flange exactly below it shall be provided for the chart clip.



All dimensions in millimetres.

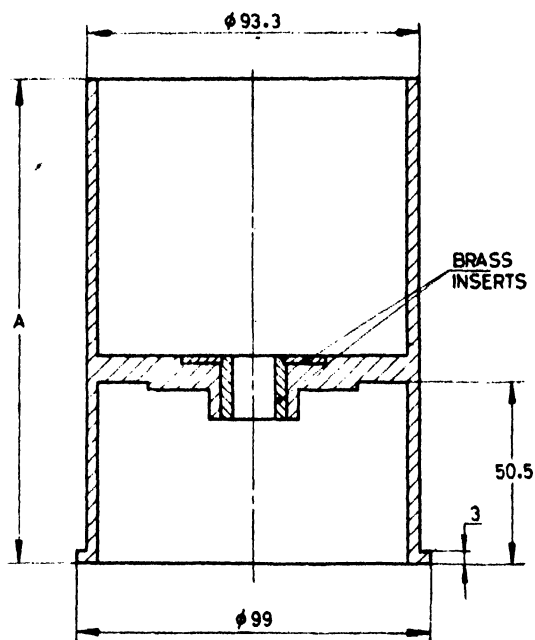
FIG. 1 GENERAL ARRANGEMENT AND DIMENSIONS FOR CLOCK MECHANISM



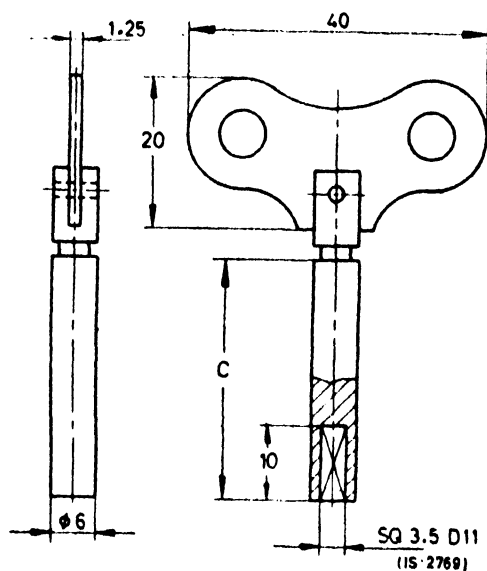
A = 90 For Short Drums
 = 130 For Medium Drums
 = 175 For Long Drums

All dimensions in millimetres.

FIG. 2 GENERAL ARRANGEMENT AND DIMENSIONS OF CLOCK MECHANISM WITH DRUM



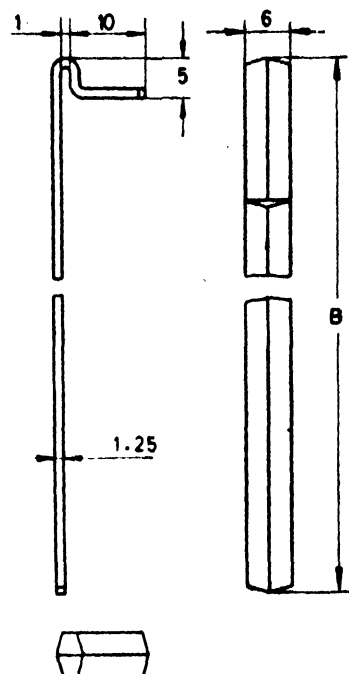
All dimensions in millimetres.
FIG. 3 DRUM SHELL (MOULDED PLASTIC)



All dimensions in millimetres.
FIG. 4 DIMENSIONS FOR WINDING KEY

6.3.3 A diaphragm shall be cast from brass and fitted inside the drum (see Fig. 2) such that when the drum is resting on the collar of the clock mechanism, it is truly vertical and rotates in a perfectly horizontal plane. The moulded plastic drum shall, however, have a brass insert as shown in Fig. 3.

6.3.4 A spring collar made from hard drawn brass sheet and fitted to the milled nut on top shall keep the drum pressed down on the arbor collar.



All dimensions in millimetres.
FIG. 5 DIMENSIONS FOR CHART CLIP

6.4 Winding Key

6.4.1 The winding key shall be short or long (see Fig. 3) to fit the drum as follows:

- a) Short key for 90 and 130 mm drum, and
- b) Long key for 175 mm drum.

6.4.2 Either of the two sizes of the winding key shall fit the barrel arbor of the clock mechanism.

6.5 Chart Clip — The chart clip shall be of three sizes to suit the different heights of drums. They shall be made from hard aluminium alloy sheet to the dimensions given in Fig. 3. The lower end of the clip shall fit smoothly into the slot on the flange of the drum. The chart clip shall be longer by 5 mm for use with the moulded plastic shells.

7. FUNCTIONAL REQUIREMENTS

7.1 The clock mechanism shall be of the best quality capable of running for 8 days on one winding. 'Quartz' clock movement operating on a single dry cell capable of working at least for six months can also be used. The movement shall be so designed that it will continue to run without any repair for a period not less than 5 years after the manufacture.

7.2 The regulator shall provide for a considerable change of rate of at least 30 minutes a day and 4 hours a week for 'daily' and 'weekly' spring driven mechanisms, respectively.

7.3 The 'daily' mechanism shall have a time scale of 11.5 mm per hour at 27°C with a drum shell of 93.3 mm dia when the regulator is in the central neutral position. Similarly, the 'weekly' mechanism shall be geared to give a time scale of 1.64 mm per hour at 27°C.

7.4 The mechanism for 'daily' clock shall be so compensated for temperature that the variation of the time scale is between 11.25 and 11.63 mm per hour for all temperatures between 0 and 40°C when the regulator is in the central neutral position. Similarly, the mechanism for 'weekly' clocks shall be compensated for temperature so as to have the variation of time scale between 1.61 and 1.66 mm per hour.

7.5 The clock mechanism with the arbor collar when fixed to an instrument by the threaded stud and wing nut, shall be perfectly vertical so that the drum shell supported on the arbor collar and rotating with it revolves on a perfectly horizontal plane.

7.6 The drum when assembled over the clock mechanism shall be perfectly concentric with respect to the clock mechanism.

7.7 The drum with clock mechanism when fitted in the instrument shall rotate on a truly horizontal plane so that the record of a pen on the chart wrapped on the drum is a perfect circle in the same plane.

8. WORKMANSHIP AND FINISH

8.1 The workmanship shall be of a very high order such that there is no strain on any of the moving parts and all the various gear wheels mesh accurately and revolve with minimum of friction. The bearings shall be lubricated with suitable grade of oil.

8.2 The finish shall be fine and smooth. The barrel plate and the barrel with cover shall be nickel plated.

8.3 All other brass parts shall be machine finished, polished smooth and coated with a very thin layer of colourless lacquer. The teeth on gears and the pivots shall be left unlacquered.

8.4 The steel parts shall be machine finished and polished smooth.

9. MARKING

9.1 Each mechanism shall bear the following inscription engraved on the dust cover of the barrel:

- a) '25.5 h' — for the 'daily' clock mechanism, and
- b) '7 d 10 h' — for the 'weekly' clock mechanism.

9.2 All the spring driven clock mechanisms shall bear the letters 'F' and 'S' close to the opening of the regulator on the barrel cover to denote the direction of movement of the regulator to adjust the clock to go faster or slower, respectively.

9.3 Each clock mechanism shall also bear the following legend engraved legibly and neatly on the barrel cover:

- a) Manufacturer's name or recognized trade-mark, and
- b) Serial number and year of manufacture.

9.3.1 The mechanism may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

10. PACKING

10.1 Each clock mechanism with drum shall be wrapped in a clean sheet of wax paper and sealed. It may also be placed inside a sealed polythene bag along with a small cloth packet containing silica gel. In either case, sufficient soft cushioning material shall be inserted at the bottom between the drum shell and the case of the mechanism to prevent the risk of alignment of two components from getting disturbed. Each clock with drum shall then be packed inside a suitable cardboard carton using a soft packing material. A convenient number of these cartons shall be packed inside a wooden box with sufficient soft packing material to ensure safety in transit. Alternately, each mechanism shall be packed as agreed to between the purchaser and the supplier.

11. SUPPLY

11.1 Each clock shall be supplied complete with arbor collar, suitable drum shell, winding key, chart clip and a wing nut with washer to enable it to be fixed to the instrument and ready for use.

12. TESTING AND INSPECTION

12.1 All the clocks and drums shall be tested individually for conformity to all the requirements of this specification.

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